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Abstract

Purpose

To evaluate the detectability of breast cancer and visibility of the tumor extent using 70-kV single-energy contrastenhanced (CE) breast computed tomography (70-kV CECT) compared with CE breast magnetic resonance imaging (CEMR).

Conventional CECT is the next best modality, with a low risk of overestimation of the tumor extent. Following recent technological innovations, low-tube voltage single-energy CECT and dual-energy CT (DECT) were developed. In the present study, we hypothesized that the higher image contrast provided by low-tube voltage single-energy CECT will improve the visibility for identifying breast cancer lesions and tumor extent. Therefore, in our study, the detectability of breast cancer lesions and accuracy of tumor extent determination on low-tube voltage (70 kV) single-energy CECT images were compared with those on CEMR images.

Methods

Between 2013 and 2015, 110 patients with 112 breast cancer lesions who underwent breast surgery after undergoing both 70-kV CECT and CEMR were enrolled. The major axis lengths of the breast lesion were measured and compared with the pathologically determined major axes. Agreement in the measured major axes was evaluated using the intra-class correlation coefficient (ICC).

Results

Both 70-kV CECT and CEMR depicted all breast cancer lesions. The mean major axis was 3.0 (95% confidence interval [CI], 2.5–3.4) cm on CECT and 2.9 (2.6–3.3) cm on CEMR. The mean differences between the pathologically and radiologically measured major axes on 70-kV CECT and CEMR were 0.9 (0.7–1.1) and 1.0 (0.8–1.2) cm, respectively. The accuracy of the radiological major axes compared with the pathological major axes was 82.1% and 80.4% on CECT and CEMR, respectively (p = 0.81). The major axes on the two modalities demonstrated moderate agreement (ICC = 0.69, 95% CI 0.58–0.77). Pathologically and radiologically measured major axes on 70-kV CECT and CEMR demonstrated excellent

agreement (ICC = 0.91, 95% CI 0.93–0.96).

Conclusions Low-tube voltage (70-kV) CECT is the preferred modality to identify breast cancer lesions and tumor extent

for preoperative planning because it has a similar diagnostic ability to CEMR and can be performed in the supine position.